6.2.6 Consideration of Public Concerns

The Draft RI/FS Report will be made available for public review and comment. The degree to which each alternative considers public concerns will be evaluated after public comments are received. Public participation processes are described in more detail in Ecology's Public Participation Plan for the Upriver Dam PCB Site.

6.2.7 Cost

Cost estimates include design, capital long-term operation and maintenance, and agency oversight costs, but do not include legal costs. Material costs are based on discussion with local suppliers. Placement costs are based on our understanding of the likely construction techniques. A contingency of 30 percent was used to cover unanticipated changes in the scope (extent of contamination) and construction approach. Based on comparisons with actual design and construction costs from similar projects, as well as the variability in the conceptual-level cost estimates developed for the Focused FS, cost estimates summarized in Tables 4 and 5 for Deposits 1 and 2, respectively, are likely accurate to within a range of approximately -30 percent to + 20 percent.

Table 4
Cost Estimate of Sediment Remediation Alternatives: Deposit 1, Upriver Dam PCB Sediments Site

Remedial Component	Units (3)	Unit Cost	Alt 1 - Monitored Natural Recovery		Alt 2 - Enhanced Natural Recovery (6-in Sand Cap)		Alt 3A - 12-in Sand Cap with Armor		Alt 3B - Gas Vent & 6-in AquaBlok™ with Armor		Alt 3C - Gas Vent & 18-in AquaBlok™ with Armor		Alt 3D - 6-in Coal with 6-in Sand Cap with Armor		Alt 3E - 18-in Coal and 6-in Sand Cap with Armor		Alt 4 - Removal with Sediment Residuals Sand Cap	
			# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost
A. Remedial Design																		
Pre-Remedial Design Evaluation/Pilot Studies	Percentage	10%	$451,000	$45,000	$536,000	$54,000	$685,000	$69,000	$919,000	$92,000	$1,469,000	$147,000	$884,000	$88,000	$1,347,000	$135,000	$2,831,000	$283,000
Design Documentation	Percentage	10%	$451,000	$45,000	$536,000	$54,000	$685,000	$69,000	$919,000	$92,000	$1,469,000	$147,000	$884,000	$88,000	$1,347,000	$135,000	$2,831,000	$283,000
Project Management	Percentage	5%	$451,000	$23,000	$536,000	$27,000	$685,000	$34,000	$919,000	$46,000	$1,469,000	$73,000	$884,000	$44,000	$1,347,000	$67,000	$2,831,000	$142,000
B. Mobilization/Demobilization & Site Prep	LS	(1)	0	$0	1	$40,000	1	$50,000	1	$50,000	1	$50,000	1	$60,000	1	$60,000	1	$100,000
C. Remove and dispose surface debris	LS	$50,000	0	$0	1	$50,000	0.8	$40,000	1	$50,000	0.8	$40,000	1	$50,000	0.8	$40,000	1	$50,000
D. Sand Cap																		
Purchase and haul	Ton	$14	0	$0	6,600	$92,000	11,100	$155,000	8,900	$125,000	8,900	$125,000	6,600	$92,000	6,600	$92,000	22,200	$311,000
Mechanical placement of sand	Ton	$12	0	$0	6,600	$79,000	11,100	$133,000	8,900	$107,000	8,900	$107,000	6,600	$79,000	6,600	$79,000	22,200	$266,000
E. Armor Layer																		
Purchase and haul	Ton	$14	0	$0	0	$0	4,800	$67,000	4,800	$67,000	4,800	$67,000	4,800	$67,000	4,800	$67,000	0	$0
Mechanical placement	Ton	$11	0	$0	0	$0	4,800	$53,000	4,800	$53,000	4,800	$53,000	4,800	$53,000	4,800	$53,000	0	$0
F. AquaBlok™																		
Formulation of material	Ton	$150	0	$0	0	$0	0	$0	800	$120,000	2,400	$360,000	0	$0	0	$0	0	$0
Mechanical placement	Ton	$200	0	$0	0	$0	0	$0	800	$160,000	2,400	$480,000	0	$0	0	$0	0	$0
G. Granular Bituminous Coal																		
Purchase and haul	Ton	$36	0	$0	0	$0	0	$0	0	$0	0	$0	4,000	$144,000	10,400	$374,000	0	$0
Precision mechanical placement of coal	Ton	$38	0	$0	0	$0	0	$0	0	$0	0	$0	4,000	$152,000	10,400	$395,000	0	$0
H. Deposit 1 Dredging and Disposal																		
Dredging	CY	$23	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	23,400	$538,000
Offloading	CY	$3	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	23,400	$70,000
Haul and dispose	Ton	$40	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	35,100	$1,404,000
Bathymetric controls	LS	$5,000	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	1	$5,000
Water quality monitoring	LS	$10,000	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	1	$10,000
I. Long-term Monitoring (2)																		
Bathymetric surveys	EA	$10,000	10	$100,000	6	$60,000	4	$40,000	4	$40,000	4	$40,000	4	$40,000	4	$40,000	1	$10,000
Surface sediment sampling & analysis	EA	$20,000	10	$200,000	6	$120,000	4	$80,000	4	$80,000	4	$80,000	4	$80,000	4	$80,000	2	$40,000
Water column sampling and analysis	EA	$5,000	2	$10,000	2	$10,000	2	$10,000	2	$10,000	2	$10,000	2	$10,000	2	$10,000	2	$10,000
Monitoring reports	EA	$10,000	10	$100,000	6	$60,000	4	$40,000	4	$40,000	4	$40,000	4	$40,000	4	$40,000	1	$10,000
Project management	Percentage	10%	$410,000	$41,000	$250,000	$25,000	$170,000	$17,000	$170,000	$17,000	$170,000	$17,000	$170,000	$17,000	$170,000	$17,000	$70,000	$7,000
J. Agency Oversight	Percentage	10%	$564,000	$56,000	$671,000	$67,000	$857,000	$86,000	$1,149,000	$115,000	$1,836,000	$184,000	$1,104,000	$110,000	$1,684,000	$168,000	$3,539,000	$354,000
K. Contingency	Percentage	30%	$620,000	$186,000	$738,000	$221,000	$943,000	$283,000	$1,264,000	$379,000	$2,020,000	$606,000	$1,214,000	$364,000	$1,852,000	$556,000	$3,893,000	$1,168,000
TOTAL ESTIMATED COST				**$806,000**		**$959,000**		**$1,226,000**		**$1,643,000**		**$2,626,000**		**$1,578,000**		**$2,408,000**		**$5,061,000**

(1) Mobilization costs were assumed similar for the different capping projects with variations accounting for more complex set up requirements. Mobilization costs for dredging were assumed higher.

(2) Long-term monitoring to verify the continued performance of the remedy was assumed to occur at 2- to 5-year intervals following construction, with the scope of monitoring varying depending on the alternative. Sampling activities were assumed to include bathymetric and surface sediment sampling within Deposit 1, and water quality monitoring of bottom waters immediately upstream and downstream of Deposit 1

(3) Material tonnages were estimated based on typical unit weights for placed materials in the region: 1.6 tons/cy for gravel; 1.5 tons/cy for sand and in-place Upriver Dam sediments; and 1.0 tons/cy for coal.

Table 5
Cost Estimate of Sediment Rememdiation Alternatives:
Deposit 2, Upriver Dam PCB Site

Remedial Component	Units (3)	Unit Cost	Alt 1 - Monitored Natural Recovery		Alt 2 - Enhanced Natural Recovery		Alt 3A - 12-in Sand Cap		Alt 4 - Removal with Sediment Residuals Sand Cap	
			# of Units	Cost	# of Units	Cost	# of Units	Cost	# of Units	Cost
A. Remedial Design										
Pre-Remedial Design Evaluation/Pilot Studies	Percentage	10%	$264,000	$26,000	$196,000	$20,000	$120,000	$12,000	$202,000	$20,000
Design Documentation	Percentage	10%	$264,000	$26,000	$196,000	$20,000	$120,000	$12,000	$202,000	$20,000
Project Management	Percentage	5%	$264,000	$13,000	$196,000	$10,000	$120,000	$6,000	$202,000	$10,000
B. Mobilization/Demobilization	LS	(1)	0	$0	1	$10,000	1	$15,000	1	$40,000
C. Sand Cap										
Purchase and haul	Ton	$14	0	$0	300	$4,000	500	$7,000	900	$13,000
Mechanical placement	Ton	$19	0	$0	300	$6,000	500	$10,000	900	$17,000
D. Area 2 Dredging and Disposal										
Isolate reach with temporary dam	LS	$1,000	0	$0	0	$0	0	$0	1	$1,000
Dredging	CY	$24	0	$0	0	$0	0	$0	700	$17,000
Haul and dispose	Ton	$40	0	$0	0	$0	0	$0	1,100	$44,000
Survey controls	LS	$2,000	0	$0	0	$0	0	$0	1	$2,000
Water Quality monitoring	LS	$2,000	0	$0	0	$0	0	$0	1	$2,000
E. Long-term Monitoring (2)										
Bathymetric surveys	LS	$10,000	6	$60,000	4	$40,000	2	$20,000	1	$10,000
Surface sediment sampling & analysis	LS	$20,000	6	$120,000	4	$80,000	2	$40,000	2	$40,000
Monitoring reports	LS	$10,000	6	$60,000	4	$40,000	2	$20,000	1	$10,000
Project management	LS	10%	$240,000	$24,000	$160,000	$16,000	$80,000	$8,000	$60,000	$6,000
F. Agency Oversight	Percentage	10%	$329,000	$33,000	$246,000	$25,000	$150,000	$15,000	$252,000	$25,000
G. Contingency	Percentage	30%	$362,000	$109,000	$271,000	$81,000	$165,000	$50,000	$277,000	$83,000
TOTAL ESTIMATED COST				**$471,000**		**$352,000**		**$215,000**		**$360,000**

(1) Mobilization costs were assumed similar for the different capping projects with variations accounting for more complex set up requirements. Mobilization costs for dredging were assumed higher.

(2) Long-term monitoring to verify the continued performance of the remedy was assumed to occur at 2- to 5-year intervals following construction, with the scope of monitoring varying depending on the alternative. Sampling activities were assumed to include bathymetric and surface sediment sampling within Deposit 2.

(3) Material tonnages were estimated based on typical unit weights for placed materials in the region: 1.6 tons/cy for gravel; 1.5 tons/cy for sand and in-place Upriver Dam sediments; and 1.0 tons/cy for coal.

6.3 Recommended Remedial Alternative

The preceding sections present and evaluate different remediation alternatives and sub-alternatives that represent a wide range of remedial technologies and process options. When viewed together, the relative benefits and tradeoffs associated with implementation of different alternatives are apparent. The comparative MTCA evaluation of remedial alternatives is summarized in Table 3.

This section identifies the recommended cleanup action alternative for the Site, consistent with MTCA requirements. As discussed above, the community's comments will also be considered by Ecology when selecting the cleanup remedy for the site under MTCA.

Pending public comment, based on a comparative evaluation of the other evaluation criteria presented above, the provisional preferred alternative for the Upriver Dam PCB Site for Deposit 1 is Alternative 3D – Capping with 6 inches of coal overlain with sand and gravel armor (see Section 6.2.3 for a more detailed description of representative process option 3D-1). The contingent remedy for Deposit 1 is Alternative 3B – Capping with 6 inches of AquaBlok™ underlain with a gas venting layer and covered gravel armor, to be implemented in the event that more detailed final design and cost analyses indicate that Alternative 3B can be implemented at less cost than Alternative 3D (both options are equally protective, as summarized in Table 3). Alternative 4 – Dredging, Off-Site Disposal, and Residuals Cap, would be implemented in Deposit 2. The integrated cleanup remedy for the Upriver Dam PCB Site blends a number of remedial technologies, including in situ treatment, off-site disposal, in situ engineered containment, and compliance monitoring with adaptive management. The following attributes contribute to the provisional identification of the combined remedial option as the recommended cleanup remedy for the Site.

- Complies with MTCA and with other applicable standards and laws.
- Achieves human health and environmental protection in a relatively rapid time frame, compared with the range of alternatives evaluated.
- Uses in situ treatment technologies to sequester porewater PCBs below the biologically active layer, to the maximum extent practicable.
- Includes protective, engineered in situ confinement of subsurface sediments that are not practicable to remove.

- Has minimal short-term construction risks, compared with the range of alternatives evaluated.
- Uses multiple technologies (e.g., active caps) to provide maximum long-term effectiveness.
- Is implementable.
- Is cost effective, relative to the range of alternatives evaluated (the total estimated cost of this combined remedy, including agency oversight and long-term monitoring/adaptive management costs, is approximately $1.9 million).
- Is consistent with the range of cleanup remedies evaluated and selected by EPA (2001) to address co-occurring metal contamination in the Upriver Dam area.

Alternatives 3C and 3E provide for thicker layers of AquaBlok™ and coal materials placed in Deposit 1, relative to Alternatives 3B and 3D, respectively. However, the costs associated with implementing either Alternative 3C or 3E are substantial and disproportionate relative to the incremental degree of increased environmental protection provided by the thinner cap sections provided in Alternatives 3B and 3D. For example, the surface erosion protection/bioturbation layer included in Alternatives 3B and 3D, along with subsurface layers of AquaBlok™ and underlying gas venting materials incorporated into Alternative 3B, already provide for protection from the 100-year flood condition and long-term (greater than 500 year) porewater and gas migration concerns, and equal or exceed the cap design requirements set forth in EPA and Corps capping guidance (Table 3; Palermo et al. 1998a and 1998b). Thus, the selection of Alternative 3D or 3B incorporated into the preferred remedy provides a high degree of human health and environmental protection.

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